

# CHINESE UTILITY MODEL ABSTRACTS

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## (54) **Internal Guide Pipe**

### (57) Abstract:

An internal guide pipe of a light-guide fiber cable is capable of protecting the cable and allows easy insertion. The internal guide pipe has an outside pipe made of polymer with high tensile strength, and the outside pipe allows the internal pipe to be inserted easily into an existing cable conduit together with protecting the cable.

Also, the internal guide pipe has an inside pipe positioned inside the outside pipe, and the inside pipe is made of polymer with high lubricating capability such as glass beads or piece-type graphite to decrease friction between the internal guide pipe and the cable such that the cable may be easily put into the internal guide pipe.

Reference : 801

[19]中华人民共和国专利局

[51]Int.Cl<sup>6</sup>

H02G 9/06

F16L 9/14



# [12] 实用新型专利说明书

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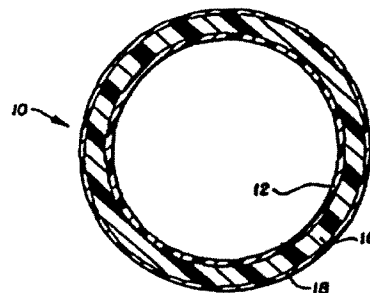
代理人 郑 立

权利要求书 1 页 说明书 3 页 附图页数 3 页

[54]实用新型名称 内导管

[57]摘要

一种用来便于装入并保护电缆、尤其是光导纤维电缆的内导管，包括一由高拉伸强度的聚合物制成的外管以便将内导管插入已有电缆管道并为电缆提供保护，还包括位于此外管内侧的内管，内管由含有高密度交联聚乙烯、玻璃小珠或片状石墨的高润滑性能的聚合物材料制成，以减小内导管与电缆之间的摩擦力，便于电缆插入内导管。



(BJ)第 1452 号

Reference: 809

## 权 利 要 求 书

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1. 一种用来保护插入其中的电缆的柔软内导管，包括一由聚合物材料制成的具有高拉伸强度的外管，其特征在于，还包括位于所述外管内侧并与之共挤压而成的内管，所述内管由含有高密度交联聚乙烯、玻璃小珠或片状石墨的高润滑性能的聚合物材料制成。
2. 如权利要求1所述的内导管，其特征在于，所述内管的内壁上具有沿其纵向延伸的肋条。
3. 如权利要求1或2所述的内导管，其特征在于，所述外管的外壁上具有沿其纵向延伸的肋条。
4. 如权利要求1所述的内导管，其特征在于，所述内管的内壁上具有沿其周向的突环
5. 如权利要求1或4所述的内导管，其特征在于，所述外管的外壁上具有沿其周向的突环。

## 内导管

本实用新型涉及一种内导管，便于将通讯和电力传输电缆安装在已有电缆管道内。更具体地，本实用新型涉及一种摩擦较小的内导管，用来安装和放置光导纤维电缆。

现在，光导纤维电缆已大量替代用于长距离通讯工业中使用的铜缆。光导纤维电缆可传输更多的信息，却比传统铜缆所占据的空间要小得多。电缆被装在已经装入已有电缆管道内的内导管内，电缆管道一般埋在地下，铜缆已被抽除，电缆也可能被装在直接埋在地下的内导管内。内导管用来在放置光导纤维电缆时显著减小摩擦力，并为光导纤维电缆提供无害的环境。

然而，由于在已有电缆管道内壁与内导管外壁之间存在着摩擦力，将内导管装入电缆管道则有一定困难。而且，在内导管装入电缆管道后，在将光导纤维电缆插入内导管时，在内导管内壁与光导纤维电缆之间存在着摩擦力。另外，内导管在制造和运输过程中其截面有时会有所变形，比如从圆形变至椭圆形，这也会增加放置内导管或放置电缆时的摩擦力。为了克服这些摩擦问题，采用了各种水溶性聚合物润滑剂。但是，由于现有电缆管道一般为3至4英寸的管子，内导管直径也较小。而且，内导管本身长度可长达1万英尺以上，因此，要在内导管的整个内表面上都施加润滑剂是很不容易的。即使大部分内导管内部或电缆本身都施加了润滑剂，卸除及替换内导管内的电缆所产生的反复的相对滑动会减少其内的润滑剂数量。而且，由于放置很长的电缆需要一定的时间，液体润滑油容易变干，使得在完成放置工作之前就失效了。

本实用新型的目的即是提供一种内导管，它在保证其具

有高拉伸强度的同时，能减少放置电缆时的摩擦力。

为实现上述目的，本实用新型的一种用来保护插入其中的电缆的内导管包括一由聚合物材料制成的具有高拉伸强度的外管，还包括位于所述外管内侧并与之共挤压而成的内管，所述内管由含有高密度交联聚乙烯、玻璃小珠或片状石墨的高润滑性能的聚合物材料制成。

为了对本实用新型的特点及优点有更进一步的了解和理解，现结合附图对本实用新型的较佳实施例进行详细描述。

图1是其内放置有一光导纤维电缆的本实用新型的内导管的立体示意图；

图2是图1内导管的截面示意图；

图3是本实用新型内导管的另一种实施例的立体图；

图4是图3所示内导管的截面示意图；

图5是本实用新型内导管的又一实施例的立体图。

现请参看图1及图2，本实用新型的内导管10用来保护插入其中的光导纤维电缆14，电缆14从内导管10的一端插入其中。如已有技术中那样，内导管10包括一由具有高拉伸强度的聚合物材料制成的外管16，以保护电缆14。制成外管16的材料比如可以是高分子重量、高密度的聚乙烯。

本实用新型的特点在于，内导管10还包括一内管12，它由用润滑剂（比如硅）浸渍过的聚合物材料（比如高密度交联聚乙烯）制成，以减小内管12的内壁与插入其中的电缆之间的摩擦系数。内管12与外管16通过同时进行热轧的共挤压方法制成。

适合于制造内管12的材料有浸渍硅的聚乙烯、浸渍石墨的聚乙烯等。浸渍硅的聚乙烯中硅的重量百分比约为0.01-20%。为了增加其抗摩擦的机械性能，可加入直径在4至6微米之间的玻璃小珠，在某些场合下其重量百分比可达24%，此重量百分比是根据硅的含量来决定的。或者，可用2-10%重量百分比的片状石墨代替玻璃小珠。

如图2所示,内导管10还可包括一附加管18,它含有颜料、稳定剂、润滑剂之类。附加管18使外管16不必再含有颜料等添加剂。

本实用新型的内导管10不但包括具有高拉伸强度的外管16,以利于内导管10插入已有的电缆管道并且为电缆14提供保护,而且包括具有高润滑性能的内管12,以便在插入电缆14时减小摩擦。进一步地,如果在电缆14的插入过程中内管12受到磨损,仍然会继续露出润滑材料,不会增加摩擦。因此,内管12是永久润滑的。

虽然图中所示的内导管10是圆形的,但也可制成任何所需形状,如椭圆形、三角形、方形等。

再请参看图3和图4,在这个实施例中,外管16的外壁上和内管16的内壁上分别成形有沿其纵向(长度方向)延伸的肋条22和20。肋条22可减小内导管10与已有电缆管道(未示)之间的接触面积,从而减小摩擦力,有利于将内导管10插入电缆管道内。肋条20可减小内导管10与光导纤维电缆14之间的接触面积。从而进一步减小了其间的摩擦力。肋条22和20的设置还有利于散去在拉伸过程中、电缆14或内导管10的插入过程中、以后的使用过程中以及卸除或替换各种管道或电缆的过程中所产生的热量,有利于保护电缆及尽量减小内导管10在卷在卷轴上时的变形。

再请参看图5,在此实施例中,外管16的外壁上和内管12的内壁上分别形成沿周向的突环24和26。突环24和26的作用与图3、4所示实施例中的肋条22和20的作用相同。

应当明白,在上述实施例中,虽然以电缆14作为内导管10的应用例子,但内导管10也可用来保护其他类似的杆件、管件等。

# 说明书附图

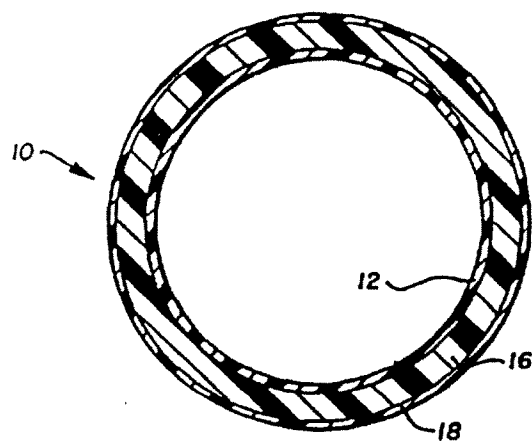


图2

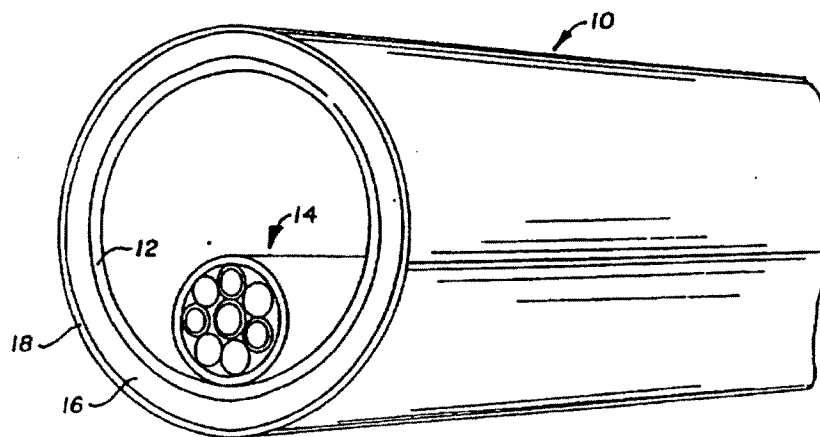


图1

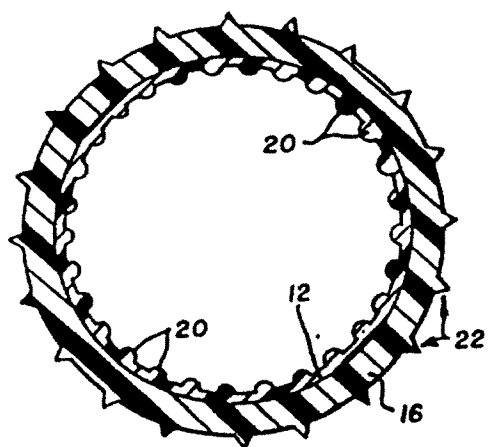


图4

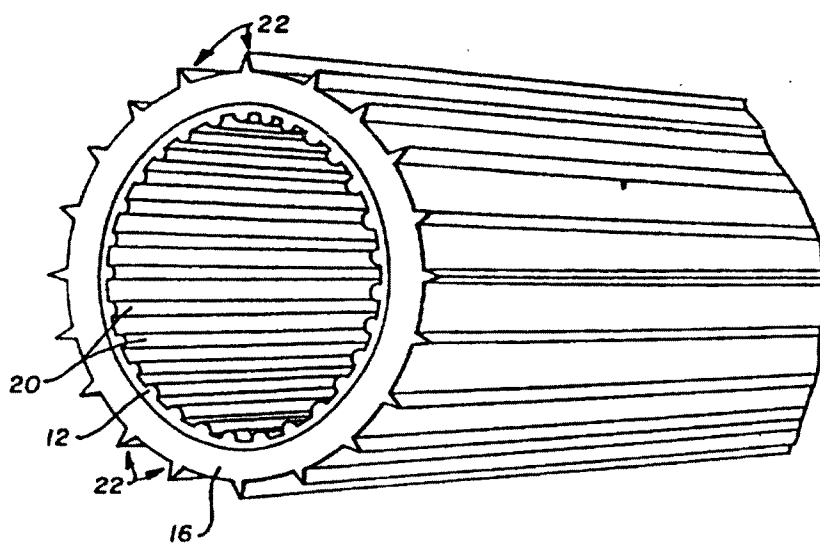


图3



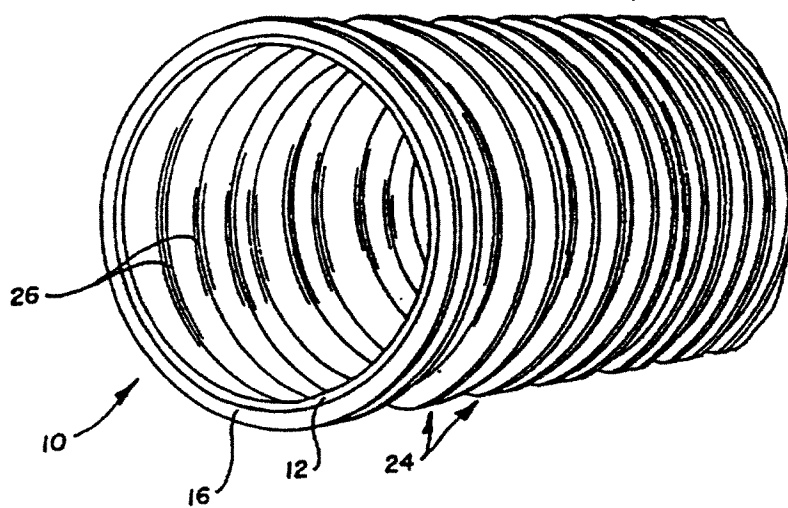


图5

# THE PATENT OFFICE OF THE PEOPLE'S REPUBLIC OF CHINA

To: 18 <sup>th</sup> Floor, Tower B, Grand Place, No.5 Huizhong Road, Chaoyang District, Beijing 100101 P.R.China Lungtin Int'l Intellectual Property Agent Ltd. Yushuang Wang & Peikun PAN		Examiner: JIN Hui	Issuing Date:  <b>October 12, 2007</b>
Application No.: <b>03826674.1</b>			
Applicant	LS Cable Ltd.		
Title of Invention	Tube for Installing An Optical Fiber Unit Having Lubricous Surface		

## THE FIRST OFFICE ACTION

(For PCT Application Entered the National Phase)

1. ☒ The applicant has filed a request for substantive examination. The examiner has proceeded the substantive examination on the above mentioned patent application for invention in accordance with the provisions of Article 35(1) of the Chinese Patent Law.  
☐ The Patent Office has decided to precede a substantive examination on the above mentioned patent application for invention in accordance with the provisions of Article 35(2) of the Chinese Patent Law.
2. ☒ The applicant requested to designate:  
the filing date June 27, 2003 in the Republic of Korea Patent Office as the priority date,  
the filing date \_\_\_\_\_ in the \_\_\_\_\_ Patent Office as the priority date,  
the filing date \_\_\_\_\_ in the \_\_\_\_\_ Patent Office as the priority date.
3. ☐ The following amended document(s) submitted by the applicant is (are) unacceptable, as the document(s) is (are) not in conformity with the provisions of Article 33 of the Chinese Patent Law:
4. ☒ The examination is proceeded based on the Chinese translation of the international application originally filed.  
☐ The examination is proceeded on the basis of the following application documents:  
☐ the description,  
pages \_\_\_\_\_, pursuant to the Chinese translation of the international application originally filed.  
pages \_\_\_\_\_, pursuant to the Chinese translation for the annexes of the International Preliminary Examination Report.  
pages \_\_\_\_\_, pursuant to the Chinese translation for the amendment submitted under Article 28 or 41 of the Patent Cooperation Treaty.  
pages \_\_\_\_\_, pursuant to the amendment submitted according to Rule 51 of the Implementing Regulations of Chinese Patent Law.  
☐ the claims,  
Nos. \_\_\_\_\_, pursuant to the Chinese translation of the international application

originally filed.

Nos. \_\_\_\_\_, pursuant to the Chinese translation for the amendment submitted under Article 19 of the Patent Cooperation Treaty,

Nos. \_\_\_\_\_, pursuant to the Chinese translation for the annexes of the International Preliminary Examination Report.

Nos. \_\_\_\_\_, pursuant to the Chinese translation for the amendment submitted under Article 28 or 41 of the Patent Cooperation Treaty,

Nos. \_\_\_\_\_, pursuant to the amendment submitted according to Rule 51 of the Implementing Regulations of Chinese Patent Law.

☐ the drawings,

pages \_\_\_\_\_, pursuant to the Chinese translation of the international application originally filed.

pages \_\_\_\_\_, pursuant to the Chinese translation for the annexes of the International Preliminary Examination Report.

pages \_\_\_\_\_, pursuant to the Chinese translation for the amendment submitted under Article 28 or 41 of the Patent Cooperation Treaty,

pages \_\_\_\_\_, pursuant to the amendment submitted according to Rule 51 of the Implementing Regulations of Chinese Patent Law.

☒ The following reference documents have been cited in this office action (their serial numbers will be referred to in the ensuing examination procedure):

Serial No.	Reference document( Number or Title)	Publication Date (or Filing date of interference patent applications)
1	CN2251821Y	April 9, 1997
2	US6398190B1	June 4, 2002

5. The conclusive opinion of the examination is as following:

☐ Description:

☐ The subject matter of the application falls into the scope, within which no patent right shall be granted, defined by Article 5 of the Chinese Patent Law.

☐ The description is not in conformity with the provisions of Article 26(3) of the Chinese Patent Law.

☐ The drafting of description is not in conformity with the provisions of Rule 18 of the Implementing Regulations of the Chinese Patent Law.

☐ The drafting of description is not in conformity with the provisions of Rule 19 of the Implementing Regulations of the Chinese Patent Law.

☒ Claims:

☐ Claim \_\_\_\_\_ does(do) not possess novelty provided by Article 22(2) of the Chinese Patent Law.

☒ Claims 1,3,4,5,6,7,8 do not possess inventiveness provided by Article 22(3) of the Chinese Patent Law.

☐ Claims \_\_\_\_\_ does(do) not possess practical applicability provided by Article 22(4) of the Chinese Patent Law.

☐ Claim \_\_\_\_\_ is(are) not in conformity with the provisions of Article 26(4) of the Chinese Patent Law.

☐ Claim \_\_\_\_\_ is(are) not in conformity with the definitions of Invention

regulated by Rule 2 of the Implementing Regulations of the Chinese Patent Law.

- ☐ Claim \_\_\_\_\_ is(are) not in conformity with the provisions of Article 31(1) of the Chinese Patent Law.
- ☐ Claim \_\_\_\_\_ is(are) not in conformity with the provisions of Rule 13(1) of the Implementing Regulations of the Chinese Patent Law.
- ☐ Claim \_\_\_\_\_ is(are) not in conformity with the provisions of Rule 20 of the Implementing Regulations of the Chinese Patent Law.
- ☐ Claim \_\_\_\_\_ is(are) not in conformity with the provisions of Article 9 of the Chinese Patent Law.
- ☐ Claims \_\_\_\_\_ is(are) not in conformity with the provisions of Rule 20 to 23 of the Implementing Regulations of the Chinese Patent Law.
- ☐

The detail analysis for above conclusive opinion is described in the text of this office action.

6. ☐ On the basis of the above conclusive opinion, the examiner holds that:
- ☐ The applicant should make amendment in accordance with the requirements described in the text of this office action.
  - ☒ The applicant should expound reasons for that the above mentioned patent application can be granted the patent right, and make amendments to the specification of which is not in conformity with the provisions as described in text of this office action; otherwise the patent right shall not be granted.
  - ☐ The patent application does not possess any substantive patentable contents, if the applicant fails to expound reasons or the reasons expounded are not sufficient, this application will be rejected.
  - ☐
7. The applicant shall pay more attention to the matters as following:
- (1) In accordance with the provisions of Article 37 of the Chinese Patent Law, the applicant shall submit the response within four months from the date of receiving this office action. If the applicant fails to respond within the time limit without any justified reason, the application shall be deemed to have been withdrawn.
  - (2) The amendment modified by the applicant shall be in conformity with the provisions of Article 33 of the Chinese Patent Law, and shall be submitted in duplicate copies and in format in accordance with the relevant provisions of the Examination Manual.
  - (3) The applicant's response and/or amendment documents shall be mailed or submitted to the Receiving Department of the Chinese Patent Office; the documents which are not mailed or submitted to the Receiving Department do not possess legal effect.
  - (4) The applicant and/or his (its) agent shall not come to the Chinese Patent Office to interview with the examiner without an appointment.
8. The text of this office action consists of a total of 3 sheet(s), and is accompanied by the following annexes:
- ☒ The copies of the cited reference documents consist of 2 sets and 15 sheets.
  - ☐

Examiner: JIN Hui (9616)

Department of Examination: Examination Cooperation Center

## Text of the First Office Action

Application No.: 038266741

The comments made after entirely examination of the application are as follows:

**Claim 1** claims a tube for installing an optical fiber unit. Reference document 1 (CN2251821Y) discloses an “inner conduit for installing and placing a photoconductive fiber cable”, and discloses the following technical features in detail (refer to line 27 of page 1 to line 9 of page 3 of the description and FIGs. 1-2): the inner conduit comprises an outer tube 16 (equivalent to the “sheath” in claim 1 of the present application) made of polymer material having high tensile strength, and further comprises an inner tube 12 (equivalent to the “inner layer” in the claim 1 of the present application) situated on the inner side of the outer tube and formed with the outer tube by extrusion; the inner tube 12 is made of polymer material impregnated with lubricant in order to decrease the frictional coefficient between the inner wall of the inner tube 12 and the cable inserted therein, that is the inner tube has a lubricating component for decreasing friction against the cable.

Compared the technical solutions of the claim 1 with the technical contents disclosed in reference document 1, the difference consists in that the sheath claimed by claim 1 is made of polymer with a lower frictional coefficient than polyethylene in order to decrease friction when the tube is installed in the communication pipe. Reference document 2 (US6398190B1) discloses a “cable assembly”, wherein (refer to line 65 of column 2 to line 10 of column 3, line 48 of column 4 to line 5 of column 5 of the description and FIG. 1, 4) the cable assembly 2 includes a cable member 4 and an outer jacket member 6, the out jacket member is made from low friction synthetic fibers, such as polyester, nylon, or Teflon. In use, the outer jacket member 6 carrying one or more cables 4 passes through one channel of the inner tube 14 without directly subjecting the cable 4 to high levels of friction. Among the material of the jacket member,

Teflon (polytetrafluoroethylene, or PTFE) has a frictional coefficient of 0.04 ~ 0.15, lower than that of polyethylene (the frictional coefficient of low density polyethylene is 0.30 ~ 0.80, and that of the high density polyethylene is 0.08 ~ 0.20 ). Moreover, the jacket member made from the low friction material allows the cable to be inserted into a rigid or semi-rigid conduit with greater speed, less friction, and less damage to the cable itself.

It can be seen that the function of above-mentioned distinguishing features in reference document 2 is the same as that in the invention for solving the technical problem, both for decreasing friction. So reference document 2 provides the technical hint of applying the technical features to the technical solution of reference document 1 to solve its technical problem. The hint may allow the skilled person in the art, when facing the said technical problem, to have the motivation of improving the technical solution in reference document 1 of combining reference document 2 into reference document 1 to obtain the technical solution claimed in claim 1. The technical solution of claim 1 is obvious to the skilled person in the art, thereby does not have the prominent substantive features and the notable progress. Thus, claim 1 does not possess the inventiveness under Paragraph 3 of Article 22 of the China Patent Law.

**Claim 3** is a dependent claim and the additional technical feature thereof is “the sheath includes a lubricous component so as to decrease friction between the tube and the communication pipe”. The technical problem to be solved in claim 3 is to decrease friction between the tube and the communication pipe. Reference document 1 (refer to the same as above) discloses the following technical features: the inner tube 12 (equivalent to the “inner layer” in the present application) made of polymer (for example: high density crosslinked polyethylene) impregnated with lubricant (such as silicon or graphite) in order to decrease the frictional coefficient between the wall of the inner tube 12 and the cable inserted therein. That is, in reference document 1, a lubricous component is added into the material of the inner layer to minish friction. When dealing with the problem of high level friction between the tube and the communication pipe, it's of necessity for the skilled person in the art to add lubricous components into the material of sheath of

the tube to minish friction, which is also the common means for solving the technical problem in the art. Thus it is obvious for the skilled person in the art to obtain the technical solution of claim 3 depending on claim 1, by combining reference document 2 and the commonsense in the field on the basis of reference document 1. Therefore, claim 3 does not have the prominent substantive features and the notable progress, thus does not possess the inventiveness under Paragraph 3 of Article 22 of the China Patent Law.

**Claim 4** is a dependent claim of claim 3 and the additional technical feature thereof is “the lubricous component is silicon, carbon or PBT”. However, it’s a common sense in the art that silicon, carbon or PBT have lubricant function and can be added into the material as a lubricous component. Thus, as the cited claim 3 does not possess the inventiveness, it is obvious for the skilled person in the art to obtain the technical solution in claim 4 by combining reference document 2 and the common sense in the field on the basis of reference document 1. Therefore, claim 4 does also not have the prominent substantive features and the notable progress, thus does not possess the inventiveness under Paragraph 3 of Article 22 of the China Patent Law.

**Claim 5** is a dependent claim of claim 1 and the additional technical feature thereof is “the polymer is polyethylene containing a lubricous component”. Reference document 1 (refer to the same as above) presents that the material of the outer tube 16 (equivalent to the “sheath” in claim 5) may be polyethylene of high molecular weight and high density, and that adding a lubricous component into polyethylene in order to decrease friction between the tube and the communication pipe is the common sense in the art. So it is obvious for the skilled person in the art to obtain the technical solution claimed in claim 5 by combining reference document 2 and the common sense in the field on the basis of reference document 1. Therefore, claim 5 does not have the prominent substantive features and the notable progress, thus does not possess the inventiveness under Paragraph 3 of Article 22 of the China Patent Law.

**Claim 6** is a dependent claim of claim 5, and the additional feature thereof is “the lubricous component is silicon, carbon or PBT”. As described above, it’s a

common sense in the art that silicon, carbon or PBT have lubricant function and can be added into the material as a lubricous component. Thus as the cited claim 5 does not possess the inventiveness, it is obvious for the skilled person in the art to obtain the technical solution claimed in claim 6 by combining reference document 2 and the common sense in the field on the basis of reference document 1. Therefore, the claim 6 does also not have the prominent substantive features and the notable progress, thus does not possess the inventiveness under Paragraph 3 of Article 22 of the China Patent Law.

**Claim 7** is an independent claim that claims a tube for installing an optical fiber unit. Reference document 2 (US6398190B1) discloses a “cable assembly”, wherein (refer to line 65 of column 2 to line 10 of column 3, line 48 of column 4 to line 5 of column 5 of the description and FIG. 1, 4) the cable assembly 2 includes a cable member 4 (equivalent to “optical fiber unit” in claim 7 of the present application) and an outer jacket member 6, the out jacket member is of a single-layer structure, made from low friction, synthetic fibers such as polyester, nylon, Teflon. In use, the outer jacket member 6 carrying one or more cables 4 passes through one channel of the inner tube 14 without directly subjecting the cable 4 to high levels of friction. Among the material of the jacket member, Teflon (polytetrafluoroethylene, or PTFE) has a frictional coefficient of 0.04 ~ 0.15, lower than that of polyethylene (the frictional coefficient of low density polyethylene is 0.30 ~ 0.80, and that of the high density polyethylene is 0.08 ~ 0.20 ).

Compared the technical solutions of claim 7 with the technical contents disclosed in reference document 1, the difference consists in that claim 7 claims a single layer tube, and the jacket member disclosed in reference document 2 is a single layer woven article. However, the material of Teflon (polytetrafluoroethylene) for the single layer woven article can also make a tube, which is determined by its inherent property. So it is obvious for the skilled person in the art to obtain the technical solution claimed in claim 7 by combining reference document 2 and the common sense in the field on the basis of reference document 1. Therefore, claim 7 does not have the prominent substantive features



and the notable progress, thus does not possess the inventiveness under Paragraph 3 of Article 22 of the China Patent Law.

**Claim 8** is a dependent claim of claim 7 and the additional technical feature thereof is that “the single layer is composed of PBT”. PBT (Poly Butylene Terephthalate) is a generally known and commonly used material in the field of producing and laying optical fiber, so the additional technical feature is a common sense in the field. Therefore as the cited claim 7 does not possess the inventiveness, claim 8 does not possess the inventiveness under Paragraph 3 of Article 22 of the China Patent Law.

Based on the above reasons, the application cannot be granted a patent right. The applicant should respond to the problems presented in the Notification within the prescribed time limit of response, and amend the application documents if necessary; otherwise the application is difficult to be granted. It should be noted that the amendments should meet the requirements of Article 33 of the China Patent Law, i.e. amendments may not go beyond the scope of the disclosure recorded in the initial specification and claims.

Examiner: JIN Hui

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